

We Claim:

1. An electro-optical module for transmitting and/or receiving light of a plurality optical data channels, comprising:

an optical waveguide for carrying light of a plurality of optical data channels, said optical waveguide having an optical axis; and

at least one optical component, said optical component selected from the group consisting of a transmitting component providing light that is injected into said optical waveguide, and a receiving component that receives light output from said optical waveguide;

said optical waveguide forming at least two optical waveguide sections;

said at least two optical waveguide sections including a first optical waveguide section having an inclined end surface and a second optical waveguide section having an inclined end surface;

said inclined end surface of said first optical waveguide section being positioned along the optical axis and behind said inclined end surface of said second optical waveguide section;

said inclined end surface said second optical waveguide section configured to perform a function selected from the group consisting of:

injecting light for one of said plurality of said optical data channels into said optical waveguide when the injected light is provided to said inclined end surface of said second optical waveguide section at an angle relative to the optical axis of said waveguide, and

outputting light of one of said plurality of said optical data channels from said optical waveguide at an angle relative to the optical axis of said waveguide.

2. The module according to claim 1, comprising a wavelength-selective filter coating at least one end surface that is selected from the group consisting of said inclined end surface of said first optical waveguide section and said inclined end surface of said second optical waveguide section.

3. The module according to claim 2, wherein said inclined end surface of said first optical waveguide section and said inclined end surface of said second optical waveguide section are coplanar.

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4. The module according to claim 1, wherein said inclined end surface of said first optical waveguide section and said inclined end surface of said second optical waveguide section are coplanar.

5. The module according to claim 4, wherein said inclined end surface of said first optical waveguide section and said inclined end surface of said second optical waveguide section each form an angle of essentially 45° with respect to the optical axis of said optical waveguide.

6. The module according to claim 1, comprising:

a first glass ferrule receiving said first optical waveguide section and having an end surface that is inclined to correspond to said inclined end surface of said first optical waveguide section, said first glass ferrule being transparent for the light of the plurality of the optical channels; and

a second glass ferrule receiving said second optical waveguide section and having an end surface that is inclined to correspond to said inclined end surface of said second optical waveguide section, said second glass ferrule being transparent for the light of the plurality of the optical channels.

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7. The module according to claim 6, comprising a mounting tube that receives said first glass ferrule, said first optical waveguide section, said second glass ferrule, and said second optical waveguide section and that axially positions said first glass ferrule with respect to said second glass ferrule.

8. The module according to claim 7, wherein said mounting tube is formed with a radial opening for insertion of an immersion means, said radial opening formed adjacent said first optical waveguide section and said second optical waveguide section.

9. The module according to claim 7, comprising:

a semiconductor pack for mounting on a printed circuit board, said optical component located in said semiconductor pack;

said mounting tube having a side mounted to said semiconductor pack.

10. The module according to claim 7, wherein said mounting tube is formed with a longitudinal slot, said mounting tube surrounds said first glass ferrule and said second glass ferrule and exerts a spring force on said first glass ferrule and said second glass ferrule.

11. The module according to claim 10, comprising:

a holder;

said mounting tube ~~40~~ formed with a fixing structure for fixing said mounting tube on said holder.

12. The module according to claim 11, wherein said fixing structure is longitudinal grooves.

13. The module according to claim 7, comprising:

a holder;

said mounting tube 40 formed with a fixing structure for fixing said mounting tube on said holder.

14. The module according to claim 13, wherein said fixing structure is longitudinal grooves.

15. The module according to claim 1, comprising:

immersion means;

said first optical waveguide section and said second optical waveguide section defining a gap therebetween;

said immersion means filling said gap and having a matched refractive index.

16. The module according to claim 15, wherein said mounting tube 40 is formed with a radial opening for insertion of an immersion means, said radial opening formed adjacent said first optical waveguide section and said second optical waveguide section.

17. The module according to claim 1, comprising:

a plurality of waveguide sections having inclined surfaces, said plurality of said waveguide sections including said at least two waveguide sections;

said at least one optical component including a plurality of optical components that are each selected from the group consisting of a transmitting component providing light that is injected into said optical waveguide, and a receiving component that receives light output from said optical waveguide;

said plurality of said optical components being located one behind another;

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each one of said plurality of said optical components being associated with an inclined surface selected from the group consisting of said inclined surfaces of said plurality of said waveguide sections.

18. The module according to claim 17, wherein said plurality of said optical components are located along the optical axis.

19. The module according to claim 1, wherein said second optical waveguide section has an optical axis and said optical component has an optical axis that runs essentially parallel to the optical axis of said second optical waveguide section.

20. The module according to claim 1 comprising a TO-can holding said optical component.

21. The module according to claim 20, comprising:

a first glass ferrule receiving said first optical waveguide section and having an end surface that is inclined to correspond to said inclined end surface of said first optical waveguide section, said first glass ferrule being transparent for the light of the plurality of the optical channels;

a second glass ferrule receiving said second optical waveguide section and having an end surface that is inclined to

correspond to said inclined end surface of said second optical waveguide section, said second glass ferrule being transparent for the light of the plurality of the optical channels;

a mounting tube that receives said first glass ferrule, said first optical waveguide section, said second glass ferrule, and said second optical waveguide section and that axially positions said first glass ferrule with respect to said second glass ferrule; and

a mounting pack that accommodates said TO can, said mounting pack including a retaining cap for accommodating and holding said mounting tube.

22. The module according to claim 21, wherein said mounting pack is formed with a window through which light can pass.

23. The module according to claim 21, wherein said mounting pack is formed of a translucent material.

24. The module according to claim 1, comprising:

a coupling lens;

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said optical component and said inclined end surface of said second optical waveguide section defining a beam path therebetween;

said coupling lens located in the beam path between said optical component and said inclined end surface of said second optical waveguide section.

25. The module according to claim 1, wherein:

said second optical waveguide section has a core;

said first optical waveguide section is adjacent said second optical waveguide section and has a core in that is larger than said core of said second waveguide section.

26. The module according to claim 1, wherein said optical waveguide is a single-mode waveguide.

27. The module according to claim 1, comprising:

a plurality of wavelength selective filter coatings that are selective for different wavelengths;

said at least two waveguide sections defining a plurality of waveguide sections having a plurality of inclined end surfaces; and

each one of said plurality of said different wavelength selective coatings being associated with a respective one of the plurality of the optical data channels and being coated on a respective one of said plurality of said inclined end surfaces.

28. The module according to claim 1, wherein said inclined surface of said first waveguide section and said inclined end surface of said second waveguide section are adjacent and form a beam splitter.

29. The module according to claim 28, wherein said beam splitter is a 50/50 beam splitter.

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